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Comments on "Assessment of the low-temperature EnviNOx® variant for catalytic N_2O abatement over steam-activated FeZSM-5: Miguel A.G. Hevia, Javier Pérez-Ramírez, Appl. Catal. B: Environ. 77 (2008) 248–254"

Dear Sirs,

We challenge in the strongest possible terms the claim, which is implicit in the title of the above paper and permeates the paper itself, that the authors Hevia and Peréz-Ramírez have performed any kind of useful evaluation of the EnviNOx® "low-temperature variant". As we will demonstrate, the conclusions drawn in the paper are based on false premises. The authors' experimental results were obtained with catalytic materials which have little in common with those used in the EnviNOx® process. The comments made by the authors on the suitability or otherwise of the EnviNOx® process for commercial applications are devoid of any foundation and as such should be deleted from their paper.

The authors of the paper in question, Hevia and Peréz-Ramírez, set themselves the task of evaluating the low-temperature variant of the commercially proven EnviNOx® process for the abatement of NO_x and N_2O in nitric acid plant tail gases. This process involves the combined reduction of NO_x with ammonia and N_2O with hydrocarbons. If carried out responsibly the authors' project is a perfectly legitimate and highly interesting undertaking.

However, the authors have allowed themselves to be deflected from achieving their aims by an obvious lack of objectivity and scientific rigour:

1. The authors did not carry out a proper literature survey before starting. Had they done so, they would have known, contrary to their claims, that the "low-temperature" EnviNOx® variant is indeed protected by patents in many countries.
2. The authors approached Süd-Chemie with a request for a sample of the catalyst used in the EnviNOx® process. They did not, however, receive any. Thus without any knowledge of the properties of the real EnviNOx® catalyst the authors decided to use a steam-activated FeZSM-5 with which one of the authors had had some previous experience in more or less similar applications [see authors' references] as a substitute "EnviNOx® catalyst."
3. Having carried out a number of experiments which of themselves seem carefully executed and produce scientifically interesting data, the authors then assume that it is legitimate to transfer the results obtained from their catalyst to the catalyst of the EnviNOx® process, although the two catalysts have nothing in common other than that they are both catalytic iron zeolite materials. Because the catalyst tested by the authors proves to have significant deficits if used for the combined reduction of NO_x and N_2O with ammonia and methane, they conclude that the EnviNOx® catalyst will have similar deficits which would make the EnviNOx® process difficult or impossible to operate. Indeed, it is for just this reason that catalysts of the type tested by the authors are not used in the EnviNOx® "low-temperature" process.
4. Without providing any evidence in support of their statement the authors claim that in comparison with secondary N_2O abatement technologies, the "low-temperature EnviNOx® variant is not attractive due to the relatively high capital cost as well as the running cost associated with the use of a reducing agent such as natural gas or other hydrocarbons." A proper economic comparison between secondary N_2O abatement technologies and a tertiary tail gas treatment technology such as EnviNOx® involves a whole range of parameters such as initial investment cost, catalyst operating life and cost of replacement, possible effects on nitric acid production capacity, and very significantly, the amount of N_2O actually destroyed. On most of these measures EnviNOx® is in fact superior to secondary technologies. It should also not be forgotten that an attractive property of EnviNOx® is that it also virtually eliminates emissions of NO_x, a feat which remains to be demonstrated by secondary N_2O abatement technologies.

Despite hedging their paper about with such disclaimers and qualifying statements as "Our conclusions have been drawn from results with a steam-activated FeZSM-5 catalyst and not with the EnviCat®-N_2O catalyst used in the EnviNOx® process" and "whether these results can be fully extrapolated to other iron-containing systems, and more particularly to the Uhde catalyst, requires further experimentation" the tenor of the paper is that the conclusions *are* valid for the EnviNOx® process. If the authors had wanted to convey a different impression they would at most have mentioned EnviNOx® in passing. As the paper stands the unavoidable effect is to discredit EnviNOx® not only in the scientific community but also in the minds of potential industrial users of the technology.

Incidentally, independent evidence disproving the authors' assertion that "the high sensitivity of the de-N_2O function to ammonia and nitric oxide over FeZSM-5 is a major drawback of the EnviNOx® variant for tail gases <700 K" can be found at the web site of the UNFCCC (United Nations Framework on Climate Change) http://www.unfccc.int/cdm. It is here that the Monitoring Reports for all greenhouse gas emission reduction projects under the Clean Development Mechanism of the Kyoto Protocol are published. The Monitoring Reports are produced by independent standards organisations such DNV, TÜV Nord, etc. after intense scrutiny of the emissions monitoring system and data records of the project. The Monitoring Reports for the "low-temperature" EnviNOx® process variant at Abu Qir Fertilizer Co. in Egypt, Hu-Chems Fine Chemical Corp. (plants #2 and #3) in South Korea and OMNIA Fertilizer Ltd. in South Africa attest consistent, high rates of N_2O abatement of 96% to over 99%. This performance, which is

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unrivalled by any competing technology for which Monitoring Reports have been published, conclusively demonstrates the trouble-free operation that characterises EnviNOx® technology.

Michael Groves
Hydrogen & Nitrates Division, Uhde GmbH,
D-44141 Dortmund, Germany

Meinhard Schwefer
Research & Development Division, Uhde GmbH,
D-44141 Dortmund, Germany

E-mail address: Michael.Groves@thyssenkrupp.com
(M. Groves)

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